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# Management Sciences Division

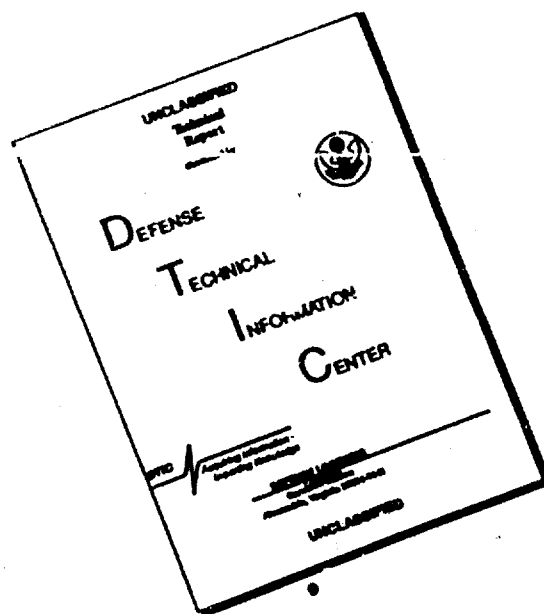
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Directorate of Plans and Programs  
HQ Air Force Materiel Command  
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## FOREWORD

The Management Sciences Division (HQ AFMC/XPS) conducts and sponsors studies and research of significant materiel issues. Our focus is on the development, modification, and application of mathematical models which can help relate resource alternatives to the peacetime readiness and wartime sustainability of AFMC's customers--the operating commands.

This is our ninth Annual Report. It includes descriptions of the projects we worked on in 1992 and our plan for 1993. If you have any comments, or suggestions for further research, contact us at DSN: 787-3201 or commercial 513-257-3201.

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## EXECUTIVE SUMMARY

The Management Sciences Division (HQ AFMC/XPS) conducts and sponsors studies and research of significant logistics issues. We use, modify, and develop new or improved methods, models, and tools to manage materiel resources.

Our goal is to quantify the relationships between alternative materiel resources and resultant aircraft availability and sustainability so that AFMC can prioritize and justify its investments in those resources. We work toward this goal by performing studies for customers in the headquarters and by pursuing a few internally developed projects which have significant potential for providing valuable insights into these relationships.

In 1992 we focused on four major areas--Distribution and Repair In Variable Environments (DRIVE), Weapon System Management Information System (WSMIS) enhancements, Engine Pipeline Studies, and the cost and responsiveness implications of a number of specific alternatives designed to reduce logistics costs.

In 1993 we plan to continue in these areas. In addition, we will spend more time helping to improve AFMC business practices; posturing AFMC for the future; assisting AFMC, and the Air Force, with the transition to two levels of maintenance; and working with the Joint Logistics Systems Center (JLSC) to develop and deploy assessment and requirements processes that can be used throughout the DoD.

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## THE MANAGEMENT SCIENCES DIVISION

The function of the Management Sciences Division (HQ AFMC/XPS) is to provide a source of operations research skills for the Headquarters. Although we are a part of the Directorate of Plans and Programs, we often perform our studies and analyses for clients outside the Directorate. We work closely with our customers as we design and perform studies to ensure we have a healthy balance between the rigorous application of operations research techniques and practical, 'implementable' solutions.

The majority of our twenty analysts have advanced degrees in technical areas such as operations research, mathematics, engineering, and management sciences. Each new analyst is expected to have, or obtain within a three to four year training period, an appropriate advanced degree.

Our emphasis has been on the application of mathematical modeling techniques to improve the management of materiel resources. We have focused our efforts on the development and enhancement of mathematical models which can relate materiel resource decisions to resultant impacts on aircraft availability so that AFMC can prioritize and justify its investments in those resources. We work toward accomplishing this by performing studies for customers in the headquarters and by pursuing a few internally developed projects which have significant potential for providing valuable insights into these relationships. The Division works closely, and shares results, with other governmental and private analysis organizations.

In 1992 we focused on four major areas--Distribution and Repair In Variable Environments (DRIVE), Weapon System Management Information System (WSMIS) enhancements, Engine Pipeline Studies, and the cost and responsiveness implications of a number of specific alternatives designed to reduce logistics costs.

In 1993 we plan to continue in these areas. In addition, we will spend more time helping to improve AFMC business practices; posturing AFMC for the future; assisting AFMC, and the Air Force, with the transition to two levels of maintenance; and working with the Joint Logistics Systems Center (JLSC) to develop and deploy assessment and requirements processes that can be used throughout the DoD.

The next two sections of this report contain specifics, by function, of our 1992 accomplishments and our planned program for 1993.

## **THE ANALYTIC APPLICATIONS FUNCTION**

### **INTRODUCTION**

The Analytic Applications Function, XPSA, focuses on issues related to (1) recoverable item spares requirements computations for support of peacetime operations, (2) recoverable item spares requirements computations for achieving combat capability objectives during a wartime surge period, (3) assessment of weapon system capability due to recoverable item spares support policies and inventory status, and (4) prioritization of repair and distribution actions at the depot to achieve the best possible weapon system peacetime readiness and wartime sustainability. Most of our efforts directly relate to these four areas.

We have the Air Force technical responsibility for three recoverable item spares requirements models. The Aircraft Availability Procurement Model (AAPM) is embedded in the Recoverable Item Requirements system (D041). It incorporates aircraft availability objectives into the computation process for peacetime operating stock. The Dyna-METRIC model is the heart of the Sustainability Assessment Module (SAM) of the Weapon System Management Information System (WSMIS). Dyna-METRIC is used for wartime supply support capability assessments. The Aircraft Sustainability Model (ASM) is the computational technique employed by WSMIS/REALM to identify wartime spares requirements. We work closely with WSMIS developers and users throughout the Air Force and in other agencies to ensure a continuing ability to use the models in a valid and responsible manner.

We also have the technical responsibility for the Distribution and Repair In Variable Environments (DRIVE) model. This model is being used to prioritize repair and distribute serviceables based upon the marginal gain in operational capability. Our past efforts were directed toward formulating the concept, defining the requirements, developing the production version of the DRIVE model, resolving system issues, and developing a strategy for the implementation of DRIVE. In 1992 we continued to provide the principal technical leadership and support for the development and implementation of the production DRIVE system. We also provided the principal technical leadership in the implementation of a DRIVE innovation. This was DeskTop DRIVE which was installed at Ogden ALC to provide responsive (daily) repair and distribution priorities to support the Coronet Deuce III test of two levels of maintenance for F-16 avionics.

The function staff includes nine operations research analysts, a logistics staff officer, and a computer assistant. All of our efforts focus on improving the policies and technical methodology for achieving the greatest possible combat capability at affordable costs in logistics resources. We actively guide the AFMC staff and other Air Force agencies in incorporating these methodologies in their management of logistics resources.

### **ACCOMPLISHMENTS IN 1992**

In 1992 we focused on 5 primary efforts. These were to: (1) Support the Air Force move to two levels of maintenance by providing general analytic support that included a selection of candidate items requested by the AFMC commander and providing support to the implementation of a



responsive technique for prioritizing repair and distribution of items in the depot for the Coronet Deuce III F-16 avionics test at Ogden ALC. (2) Development of an initial logistics cell in AFMC to support wargaming and exercises and the initial groundwork for a logistics wargaming seminar that senior operators could participate in to better understand the limitations that could be imposed upon planned operations due to logistics constraints. (3) Support to the AFMC requirements computation policy office and to the Joint Logistics System Center (JLSC) to work with the other services to determine the appropriate strategy for incorporating a multi-echelon modeling technique into a system that could be used by all services for item requirements computation. (4) Guidance in the development of the AFMC Warfighting Metric and the development of a concept to link Dyna-METRIC and DRIVE together to incorporate an assessment capability in WSMIS to assess wartime capability between day 31 and day 180. (5) Design and implement the production DRIVE system to enable AFMC to provide substantially greater support to the combat commands by making depot maintenance and distribution actions more responsive to near-term sortie generation requirements. In addition we developed and delivered to the functional office a readiness based sparing technique for computing initial requirements called RBIRD - Readiness Based Initial Requirements Determination. We also continue to actively support the analytic needs of a major effort to improve the quality of the data feeding the AFMC requirements computation system. We are working to evaluate the effectiveness of Logistics Assessment Models (LAMs) which are used by System Program Directors (SPDs) to evaluate the expected impact on weapon system capability of future spares funding. Finally, we provided analysis of special issues such as the analysis we completed for the AFLC Commander in May 1992 in preparation for his testimony to Congress on the expected impact of significant reductions in funding.

**TITLE:** *AFMC Logistics Wargame Cell*

**CUSTOMER:** HQ AFMC/XP

**OBJECTIVE:** Establish a wargame logistics cell within AFMC with a two-fold objective. First, enhance the degree and realism of logistics play in wargames and exercises. Second, provide logistics education and decision-making experience for senior commanders and key staff officers.

**RESULTS:** In late March 1992 we were asked to establish a Wargame Logistics Cell in AFMC to support and enhance logistics play in today's wargames and exercises. To date we have accomplished the following:

1. The Logistics Cell, co-chaired with AFMC/XPO, was formed in June 1992. The cell membership represents major functional areas of AFMC logistics management. To offer structure and guidance, we developed a cell charter outlining the cell's objectives, responsibilities, approach and goals. Since its development, the cell has supported offices within and outside of the Headquarters with logistics data and experts.

2. During the Global Reach 2000 wargame members of the cell participated as logistics controllers and adjudicators in each of the four scenarios. As a result, the members of the panels were exposed to logistics limiting factors created by the logistics controllers.

3. On their annual data collection visit to AFMC, members from the Air Force Wargaming Center (AFWC) met with our newly formed Logistics Cell. For the first time, all their objectives for the collection of logistic data were met due to the collective experience represented within the logistics cell.

4. Coordination with HQ USAF has brought forth an Air Force awareness of AFMC's concern about logistics play and our willingness to be involved. Hence, offers to participate in future planning of Joint Chiefs of Staff sponsored games as well as opportunities to contribute to the enhancement of logistics simulation in future wargame models have been offered and accepted. Again as a result of this awareness, AFMC has been added as a member of the Wargaming Executive Steering Group.

5. The formation of the logistics cell is only one half of the ongoing effort. We are currently seeking to develop a senior officer seminar focused on logistical limiting factors that would force players to: 1) realize the logistics limitations, 2) develop alternatives and 3) exercise the best alternative. The goal of the seminar is to expose senior officers to a less than ideal logistics environment and encourage these officers to seek greater logistics consideration in wargames and exercises they sponsor.

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**TITLE:** *War Fighting Metrics for AFMC*

**CUSTOMER:** HQ AFMC/XPO

**OBJECTIVE:** Help AFMC determine its ability to provide required logistics support to the operating forces and provide a convenient means to track the indicator at regular intervals. Indicators of AFMC's contribution to wartime mission effectiveness are desired at high levels (e.g., HORIZONS). They are also useful for MAJCOMs, System Program Directors (SPDs), and item managers.

**RESULTS:** Wartime logistics support includes a number of distinct factors including munitions, missiles, support equipment, space systems, fuels, and recoverable spare parts. We supported the Warfighting Metric Working Group chaired by AFMC/XPO and provided the principal technical leadership on the election of the measure for aircraft support as a function of the availability of recoverable spares. We focused on recoverable spares because of their impact on mission capability and because of the significant role AFMC has in acquiring, managing, and repairing them.

We designed a number of enhancements for the existing Weapon System Management Information System (WSMIS) to enable it to give a good estimate of achievable sorties for a war lasting up to 6 months. The metric is computed for every major weapon system (Mission Design Series, MDS) and those with anticipated problems are highlighted. One may then look deeper into a problem MDS to see which squadrons and aircraft parts are experiencing the most trouble.

For some time now we've had the ability to measure estimated capability for the initial 30 days of war. According to Air Force planning used in building Readiness Spares Packages, the depots are not direct players in supporting the first 30 days; the bases are effectively cut off from outside support. But depot surge and carcass availability must be considered when modeling a long term war. This technique considers depot support by integrating DRIVE and Dyna-METRIC into a single capability assessment system.

System design is complete and we are now overseeing the contractor's development effort. Estimated date for the Initial Operating Capability (IOC) is December 1993. This effort will continue into next year.

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**TITLE:** *Alternative Maintenance Concepts*

**CUSTOMER:** HQ AFMC/XPX

**OBJECTIVE:** CORONET DEUCE I was an eight month test of two-level maintenance for F-16 avionics items which ended 1 Mar 92. Our objective was to integrate the various analysis efforts and keep them on track. For the follow-on CORONET DEUCE II test, we continued to provide analysis expertise as necessary. For CORONET DEUCE III our objective was to facilitate the use of the DRIVE (Distribution and Repair in Variable Environments) model for both repair induction and distribution purposes.

**RESULTS:** We took the lead in integrating the various analysis efforts for CORONET DEUCE I. As part of this effort, we quantified the impacts on the MAJCOM Repairable Support Division (RSD) budget by comparing costs of two-level and three-level maintenance using both actual base data and Dyna-METRIC 6 generated data. For CORONET DEUCE II which started in July 1992 and CORONET DEUCE III in October 1992, we concentrated on helping implement a PC version of the DRIVE model which could be run daily. The two-week DRIVE model used during CORONET DEUCE I was not timely enough for a two-level operation. Using figures from the cost benefits analysis done by the Logistics Management Institute (LMI) for all candidate two-level avionics parts (not just the F-16 parts), we did a sensitivity analysis showing how sensitive any possible two-level cost savings are to the percentage of base maintenance personnel retained and the decrease in the depot unit repair cost. We also did excursions using the Aircraft Availability Model to develop two-level candidate parts lists. The objective was to help the MAJCOMs in identifying more accurately the parts that could be moved to a two-level maintenance concept.

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**TITLE:** *Analysis Support for Two-Levels of Maintenance*

**CUSTOMER:** HQ AFMC/LGI

**OBJECTIVE:** The primary objective of this study was to develop a list of potential candidate items for switching from the traditional three-levels of maintenance to two-levels of maintenance.

**RESULTS:** We provided a list of avionics and engine NSNs for a select group of weapon systems (MDs) which are scheduled to switch their maintenance concept to two-levels. This list was broken out by MD, ALC and responsible Item Manager. The list contained buy requirements under three scenarios; a baseline using current (March 1992) D041 data, and two excursions emulating the activity expected under a two-level concept with two sets of reduced repair resupply times. We used the Air Force research version of the Weapon System Availability Model (WSAM) to compute total requirements for each NSN under the three scenarios. The output files were then merged and the requirement changes computed. Projected assets were subtracted, leaving the buy requirement for the three scenarios. Any item with the same or lower buy requirement as the baseline was marked as a potential two-level item. For the remaining items, we included the increased procurement cost to make them a two-level item as well as the increase (i.e., reliability improvement) required in mean time between demand (MTBD) to make it a 'no cost' two level item. ('No cost' really means no increase in requirement since there will be a cost associated with increasing MTBD as well as buying mods or new improved items.) These lists were passed out to the various ALCs for coordination and comments.

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**TITLE:** *Training Support and Evaluation of the Logistics Assessment Models (LAMs)*

**CUSTOMER:** HQ USAF/LGS

**OBJECTIVE:** The LAMs consist of the Tactical LAM (TLAM) and Airlift LAM (ALAM). These models provide the weapon system program director and the major command logistics programmers with an analytical tool that relates weapon systems and support funding to wartime capability. Our main objectives were to: (1) establish and maintain expertise within AFMC on the technical aspects of the LAMs being developed by the Air Staff, (2) provide LAMs training to the System Program Directors (SPDs) and their staffs and (3) provide an independent evaluation of LAMs given the following applications:

- a. Sustainability assessments for the Program Objective Memorandum (POM).
- b. Sustainability assessments for Weapon System Program Assessment Reviews (WSPARs).
- c. Sustainability assessments for use in preparation of Weapon System Master Plans.
- d. As a means of providing logistics constraints to sortie production in war fighting simulation models.

**RESULTS:** To begin our study, we developed a plan to ensure our study objectives matched those of our customer. Following HQ USAF/LGSI approval of the plan, we began our training and evaluation of the LAMs. To date we have assisted in LAMs training of six system program directors and/or staff. These include the F-15, F-16, F-117, B-52, B-1 and KC-135 weapon systems. Each session included a LAMs briefing, LAMs demonstration and a "hands-on" training period for the user. To obtain greater technical knowledge of the basis of the LAMs structure, we requested and received in-depth training on the LAMs "supply" and "maintenance" functions. These functions are key to the development of the principal output of LAMs--a weapon system's not mission capable rate. The Evaluation of LAMs is being divided between HQ AFMC/XPS and the Air Force Logistics Management Agency (AFLMA). The division of work was based on available expertise in the subject areas. AFLMA will evaluate the maintenance function and related input while we take on the supply function and remaining aspects of the LAMs. As an annex to our study plan, we are currently developing an in-depth Evaluation plan.

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**TITLE:** *Depot Asset and Usage Data Analysis from Wholesale Data Interfaces*

**CUSTOMER:** HQ AFMC/LGII

**OBJECTIVE:** Provide analysis to a cross functional team consisting of members from XP, LG, SC and each ALC. As a member of the Requirements Interface Process Improvement Team (RIPIT), we are responsible for the analysis of all data received from the various systems that feed into the Recoverable Consumption Items Requirements System (D041), starting with the Wholesale and Retail Receiving and Shipping Process (D035K).

**RESULTS:** We provided analytical support to the on-going Requirements Interface Process Improvement Team (RIPIT). In this capacity we were responsible for analyzing several system interfaces starting with the Stock Control & Distribution (SC&D) system, through the Stock Balance and Consumption Reporting System (SB&CR), and ending with the Recoverable Consumption Items Requirements System (D041). We reviewed the condemnation process and found discrepancies in how condemnations are reported through the SB&CR and Job Order Production Master System (G004L). These discrepancies include timing issues, issuing temporary control numbers, job control numbers that were zeroed out, and transactions that resulted in negative condemnations. In addition, we produced quarterly job-routed condemnation reports to be distributed to each ALC for file maintenance. These quarterly reports allow the Item Manager (IM) and Equipment Specialist (ES) to replace the job-routed condemnations that do not pass through the SB&CR. Also, we researched issues brought to us by other team members. For example, we confirmed that Technical Order Compliance (TOC) assets are not overlaid through the system, but are accumulated which possibly causes negative assets. These findings resulted in Deficiency Reports (DRs) or Computer Systems Requirements Documents (CSRDs) written against the system at fault. These problems, some identified above, greatly impact the requirements determination process. To date, \$306M of job-routed condemnations did not reach D041.

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**TITLE:** *Impact of Spares Procurement Shortfalls on Aircraft Availability*

**CUSTOMER:** AFLC/CC

**OBJECTIVE:** The Commander of AFLC was scheduled to give congressional testimony in May of 1992 on the impact of significant reductions in funding for procuring recoverable aircraft spare parts. We were asked to provide an analysis for the Commander of the impact on the ability of the operating forces to fly their programs for various funding shortfalls.

**RESULTS:** We used the Aircraft Availability Model to determine the impacts of funding only 60% and 30% respectively of the buy and repair requirement. Our analysis showed the immediate, or current year, impact on our ability to fly and train due to the maintenance funding shortfall and the longer term (or leadtime away) impact due to the procurement shortfall. We added appropriate modifications to the model to reflect management adaptations that could be expected in the face of severe shortfalls. These included more repair at base level, extensive lateral resupply, extensive cannibalizations, and elimination of negotiated levels. We provided results for these factors as well as for reduced flying programs.

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**TITLE:** *Readiness Based Initial Requirements Determination (RBIRD)*

**CUSTOMER:** HQ AFMC/LGI, SA-ALC/LAAR

**OBJECTIVE:** Improve the Air Force's provisioning process by applying readiness-based sparing (RBS).

**RESULTS:** RBS has been demonstrated to save money and to provide for improved readiness. The Air Force uses the technique to buy recoverable spares to support aircraft in peacetime and wartime. However, a number of complications have kept the Air Force from applying RBS to provisioning. The complicating factors include phased arrival of provisioning data, differences in item production lead times, and flying programs which increase over time.

We developed a methodology and a prototype readiness-based spares requirements system for initial provisioning which addresses these concerns. This prototype system, RBIRD, utilizes a data base structure very similar in appearance and functionality to the current provisioning system. Benefits include spares cost savings and inventory reduction.

The prototype RBIRD operates on an IBM-compatible microcomputer and is documented in a system specification. An enhanced version of RBIRD could eventually be used for initial provisioning of aircraft recoverable items Air Force-wide.

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**TITLE:** *Support for the Development and Implementation of WSMIS*

**CUSTOMER:** MSC/SXM, HQ AFMC/LGI, MAJCOMs

**OBJECTIVE:** Improve the quality and usefulness of the Weapon System Management Information System (WSMIS) by designing enhancements and solving technical problems. Take an active role in providing assistance to the WSMIS Program Office, the development contractors, and users of the system.

**RESULTS:** Our primary effort in support of WSMIS this year was giving HQ AMC the ability to forecast wartime utilization (ute) rates for C-5 and C-141 airlifters. We worked closely with HQ AMC to develop a fully functional prototype on a microcomputer. They have used the prototype to identify critical items and to report on airlift ute rates.

To help compensate for manpower reductions, we designed a fully automated data validation process for the Sustainability Assessment Module (SAM) of WSMIS. The process is being programmed into SAM. Once implemented, it will highlight questionable data sets and identify bases which are not reporting their on-hand spares quantities in the Combat Supplies Management System (CSMS). Additionally, various reports for management were redesigned to improve readability and focus attention on specific aircraft, squadrons, and parts which are likely to develop problems during wartime.

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**TITLE:** *Joint Logistics Support Center (JLSC) Analysis Support.*

**CUSTOMER:** HQ AFMC/LGI

**OBJECTIVE:** To provide modeling support to JLSC. XPS is providing the official Air Force view on math models used to compute spare parts requirements. The JLSC objective is to consolidate all computer processes for DoD requirements to one system (or one set of systems) that can be easily maintained by one organization.

**RESULTS:** We have provided analysts to the JLSC Models Group for the past two years. This group has examined the different models used by the four major DoD components (Air Force, Army, Navy, & DLA; Marines were invited but never attended). After examining each Service's methods, this group made several recommendations to the JLSC on the future of consolidated modeling within DoD. We are currently examining the feasibility of inserting service unique features into several potential DoD-wide models.

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**TITLE:** *XPS Implementation of Total Quality Management (TQM)*

**CUSTOMER:** HQ AFMC/XPS

**OBJECTIVE:** Refine and continue to implement the plan for Total Quality Management (TQM) in XPS. More specifically, develop and execute action plans for improving our areas of weakness pinpointed in our 1991 quality self-assessment. These areas include benchmarking, training, data quality from our suppliers, and our customer report card process.

**RESULTS:** This year we developed and began using a much easier to understand customer comment card than we had used before. This improved the customer report card process considerably because the new cards are much easier to use than previous cards and proved to be much less of a burden on our customers. The customer report cards are the primary tool we use to measure ourselves. Efforts begun earlier in the other three areas continued.

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### *Distribution and Repair in Variable Environments (DRIVE)*

In 1992, we made a significant shift in our support to the DRIVE program by moving our focus from Air Force only to the joint environment being developed by the Joint Logistics Systems Center (JLSC). Our major activities and accomplishments supporting the DRIVE program are arranged under the headings of Technical Support, Model Maintenance, Studies and Design Support, and DRIVE Extensions.

**TITLE:** *DRIVE Technical Support*

**CUSTOMER:** HQ AFMC/LGI, MSC/SXM

**ACCOMPLISHMENTS:** We continued our support of the implementation of DRIVE through our roles as the Air Force technical OPR for the DRIVE model and technical consultant to the DRIVE Functional Integration Office and Program Management Office.

a. Technical assistance: We evaluated contractor proposals, assessed needed analysis efforts and developed recommended policy and procedural impacts and solutions. The section on DRIVE Studies and Design Support, page 17, outlines some of the efforts supporting policy and procedural issues. The most significant efforts were the Multiple Sources of Repair (MSOR) and Alternatives to Intermediate Maintenance (AIM) Enhancements.

b. User support and data analysis: We continued to assist the functional OPR and ALC users in understanding why DRIVE produces its recommendations and assessing the accuracy of the system. Findings from these efforts enhance user understanding and help uncover DRIVE system shortfalls or source data system errors. Findings were provided to the specific system OPR for action or resulted in a Deficiency Report to the DRIVE contractors.

c. Training Support: We continued to assist the functional OPR in training and education efforts. We supported training at one ALC and produced a report which provides a less technical description of the DRIVE model for the ALC DRIVE staff OPR (XPS Working Paper 92-003). We also continued to brief AFIT continuing education and master's degree level classes on DRIVE and the Theater Repair and Distribution Execution System (TRADES).

d. Communications-electronics (C-E) Prototype Development: We provided technical assistance to the development of a pioneering effort to apply availability based algorithms (in this case, DRIVE) to communications-electronics systems. We will continue this support in 1993.

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**TITLE:** *DRIVE Model Maintenance*

**CUSTOMER:** HQ AFMC/LGI/XPS, MSC/SXM

**ACCOMPLISHMENTS:** We maintained the production DRIVE model and developed several significant improvements to the model. We provided this software for inclusion in the production DRIVE system.

a. Core Memory Improvements: We worked with the DRIVE contractor, Dynamics Research Corporation (DRC), to identify alternative methods for dealing with computer system memory limitations. We modified the model software to implement these improvements.

b. Multiple/Alternate Sources of Repair: We updated the model to recognize multiple/alternative sources of repair (MSOR) considerations. This was the first step towards a DRIVE system which will recommend trade-offs between competing repair locations. Our design efforts are described in DRIVE Studies and Design Activities on page 18.

c. Non-PAA Demands Logic: DRIVE considers non-flying hour demands which we term as Non-Primary Aircraft Authorized (non-PAA) demands. We updated this logic to better address the data representing these demands. The changes were included with the MSOR model release.

d. Alternatives to Intermediate Maintenance (AIM): The model was changed to recognize and properly treat expected repair and distribution actions from consolidated intermediate repair locations. The design efforts are described in DRIVE Studies on page 18. This was the most significant model change. This change, along with the added data flow from retail users, is a major first step towards integrating the wholesale and retail repair and distribution functions.

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**TITLE:** *DRIVE Studies and Design Activities*

**CUSTOMER:** HQ USAF/LGS, HQ AFMC/XPS/LGI

**ACCOMPLISHMENTS:** We conducted, or participated in, several analysis projects supporting DRIVE production system development, implementation and assessment. These activities included:

a. UMMIPS - DRIVE Comparative Analysis: We were involved in two efforts to compare DRIVE distribution prioritization to the current method, Uniform Material Movement and Issue Priority System (UMMIPS). We released documentation (XPS Technical Report 84-184-1) of our own analysis which was discussed in previous annual reports. We also provided extensive support to an expanded analysis conducted by the Logistics Management Institute (LMI). Both efforts reported that DRIVE can provide significant aircraft availability improvements over UMMIPS.

b. Requisitioning Levels: This is a continuation of the DRIVE - D028 Central Leveling System comparative analysis. The goal of the study is to examine which system provides better support and, if DRIVE is better, ensure that its distribution priorities can be carried out. We will defer this effort to RAND and provide support to them as needed.

c. Quarterly Logic: Previous DRIVE quarterly logic could, in some cases, result in mismatches with shorter term model results. We modified this logic previously and, in 1992, published documentation of our analysis of the alternative approaches (XPS Working Paper 92-002).

d. DRIVE Distribution Test: The DRIVE user community and Air Staff distribution policy OPRs sought a 'real life' exercise confirmation of the promising DRIVE-UMMIPS comparison results. In concert with the two-level maintenance prototype at Ogden ALC, a test of DRIVE distribution was designed and started by year's end. We participated in test design and will provide analysis support. Our DeskTop DRIVE efforts, discussed below, were also integral to this test.

e. Interface/Interaction With LMS Systems: We participated in an effort to define how DRIVE distribution priorities should be integrated into the Stock Control System (SCS) backorder release process. We developed a 'strawman' proposal which became the basis for a Computer System Requirements Document (CSRD).

f. DeskTop DRIVE Definition and Review: During 1992, DRC developed a PC-based analysis environment named DeskTop DRIVE. Because of its accessibility, it was chosen for use in supporting the Two-Level Maintenance prototype at Ogden ALC and as an Overseas Workload Program (OWLP) support tool for the AFMC Pacific theater depot at Kadena AB, Japan. We participated in defining the DeskTop DRIVE system capabilities, data mapping efforts for Ogden ALC use and program verification and validation. Our research for Ogden ALC use

led us to discover problems with similar production system data usage. We prepared several deficiency reports which will result in DRIVE production system improvements.

g. Production System Design Activities: Our most significant design efforts were:

(1) Multiple Sources of Repair (MSOR): This system enhancement provides visibility of contractor assets and repair resources to the user. It is the first step towards organic - contract repair trade-offs.

(2) Alternatives to Intermediate Maintenance (AIM) Enhancement: This effort resulted in a system design for passing base data directly to DRIVE and provided a model change which now considers non-located intermediate maintenance locations on base support.

(3) Air Training Command (ATC) Non-flying locations: We developed an approach to include demand forecast data for ATC locations which use aircraft parts for maintenance training but do not actually fly the parts. Our solution was implemented in the DRIVE production system.

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**TITLE:** *DRIVE Extensions*

**CUSTOMER:** HQ AFMC/LGI

**ACCOMPLISHMENTS:** A number of applications beyond the AFMC production DRIVE system are in-place or are possible candidates for using DRIVE logic. The major initiatives that we were involved with included:

a. DeskTop DRIVE/TRADES/AFMC Detachment 35 Support: We continued to provide modeling support for DRIVE derivative applications including TRADES, DeskTop and AFMC Detachment 35. In all cases, these applications use the standard production DRIVE model.

b. Enhanced Multi-Echelon System (EMS): The original intent of this effort was a RAND proposed prototype which would integrate TRADES and AFMC DRIVE to ensure that the central DRIVE is aware of TRADES actions to avoid duplication of repair and distribution actions. The formal prototype did not materialize but the AIM Enhancement described in DRIVE Studies and Design Activities on page 18 provides a framework for future expansion. It could allow a retail customer to pass repair and distribution decisions as well as the data transmission allowed with the current enhancement. This will provide a rich area for policy examination and the potential for integrating day-to-day repair and distribution decisions required for successful implementation of seamless logistics.

c. Joint DRIVE: We continued our interchange with the Army to share technical information on DRIVE and lessons learned from our respective implementations of DRIVE. During the year, DRIVE was presented to the JLSC as a joint Air Force - Army initiative. We were also involved in technical discussions with OSD and the Navy and supported the functional OPR with a variety of program planning activities. This will be a significant area for us in 1993 as well.

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## THE PROGRAM FOR 1993

In 1993 we will continue to emphasize analysis and resolution of the policy and implementation issues to field a responsive repair and distribution system (DRIVE) that will improve AFMC's support to the operating forces. We will also be very active in helping solve the problems of what the depots should repair and to where they should distribute serviceable parts to be highly responsive under the two level maintenance concept. We will play a key role in the current implementation of DeskTop DRIVE at OO-ALC and the planned implementation in 1993 at SA-ALC to help achieve the required responsiveness. We anticipate a merging of the technology of DeskTop DRIVE and production DRIVE to achieve an eventual client-server type architecture. We are optimistic that by the end of 1993 we will have the capability to estimate sustained (out to 180 days) wartime sortie generation capability due to recoverable spares support. We expect to have wargaming seminars in place to help senior leaders gain increased awareness of logistics constraints in war. We will continue to provide training to System Program Directors in the use of the Logistics Assessment Models (LAMS) and complete our evaluation of the LAMS models logic. We expect to work even more closely with the Joint Logistics System Center (JLSC) than in 1992 on resolving the issues raised by a consolidation of item requirements models within DoD. Finally, we expect that as the dust settles from the merger of Logistics and Systems Commands into the Materiel Command, we will begin looking at a broad range of new issues and potentially begin developing analysis capability for some of these.

Our planned projects in our 1993 program are listed here.

**TITLE:** *Joint Logistics Support Center (JLSC) Analysis Support.*

**CUSTOMER:** HQ AFMC/LGI, JLSC/MMR

**OBJECTIVE:** To provide modeling support to JLSC. XPS is providing the official Air Force view on math models used to compute spare parts requirements. The JLSC objective is to consolidate all computer processes for DoD requirements to one system (or one set of systems) that can be easily maintained by one organization.

**ANTICIPATED BENEFITS:** We will continue to provide analysis support to JLSC item requirements issues concerning the consolidation of models within DoD. It is anticipated that we may dedicate as much as one-half of a senior analyst's time to JLSC requirements modeling issues during 1993.

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**TITLE:** *War Fighting Metrics for AFMC*

**CUSTOMER:** HQ AFMC/XPO

**OBJECTIVE:** Help AFMC determine its ability to provide required wartime logistics support to the operating forces and provide a convenient means to track the indicator at regular intervals. Indicators of AFMC's contribution to wartime mission effectiveness are desired at high levels (e.g., HORIZONS). They are also useful for MAJCOMs, System Program Directors (SPDs), and item managers.

**ANTICIPATED BENEFITS:** Timely, credible identification of potential problems with aircraft logistics support will lead to early solutions and more sorties. The area of logistics support addressed by this study is aircraft recoverable spares although we will continue to provide assistance to the Warfighting Metric Working Group on the measurement of other support resources such as munitions, fuels, and support equipment.

We started this effort last year by designing a number of enhancements for the Weapon System Management Information System (WSMIS). The enhanced WSMIS will produce more accurate sortie forecasts in less time with fewer people. Further, the forecast will extend out to 180 days of war, versus the 30 day war which is modeled today.

This year we'll guide the contractor's development of this capability, conduct tests, and refine the assessment process. Estimated date for the Initial Operating Capability (IOC) is December 1993.

In addition to this development effort we will continue to advise the Warfighting Metrics Working Group on issues related to measurements under consideration.

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**TITLE:** *Training Support and Evaluation of the Logistics Assessment Models (LAMs)*

**CUSTOMER:** HQ USAF/LGS

**OBJECTIVE:** (1) Develop and maintain expertise within AFMC on the technical aspects of the LAMs being developed by the Air Staff. (2) Continue to provide ongoing LAMs training to System Program Directors and staff. (3) Provide an independent evaluation of LAMs given the following applications:

- a. Sustainability assessments for the Program Objective Memorandum (POM).
- b. Sustainability assessments for Weapon System Program Assessment Reviews (WSPARs).
- c. Sustainability assessments for use in preparation of Weapon System Master Plans.
- d. As a means of providing logistics constraints to sortie production in war fighting simulation models.

**ANTICIPATED BENEFITS:** Having resident expertise and training capability permits rapid technical service to AFMC users while decreasing the dependence on HQ USAF for LAMs support. The documented evaluation of the LAMs will afford the user the opportunity to judge LAMs applicability for a given assessment.

**ESTIMATED COMPLETION DATE:** We and the Air Force Logistics Management Agency (AFLMA) are developing coordinated study plans that specify how the evaluation will be accomplished. We expect to complete the LAMs baseline evaluation by September 1993.

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**TITLE:** *Participate in AFMC Logistics Wargame Cell*

**CUSTOMER:** HQ AFMC/XP

**OBJECTIVE:** The major objective of our participation is to acquire a logistics education and training program that provides decision-making experience and opportunities for senior commanders and key staff officers.

**ANTICIPATED BENEFITS:** The education and training program provides a platform to promote an awareness of logistic issues and concepts not currently realized in most Air Force and Joint Chiefs of Staff sponsored wargames, exercises, or seminars.

**ESTIMATED COMPLETION DATE:** Ongoing

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**TITLE:** *Depot Asset and Usage Data Analysis from Wholesale Data Interfaces*

**CUSTOMER:** HQ AFMC/LGII

**OBJECTIVE:** Provide analysis to a cross functional team consisting of members from XP, LG, SC and each ALC. As a member of the Requirements Interface Process Improvement Team (RIPIT), we are responsible for the analysis of all data received from the various systems that feed into the Recoverable Consumption Items Requirements System (D041), starting with the Wholesale and Retail Receiving and Shipping Process (D035K).

**ANTICIPATED BENEFITS:** The D041 system depends heavily upon the depot-level data elements we plan to examine in this study. Through the correction of data and system improvements, the D041 buy and repair requirements projections should be more accurate. This will convert to both monetary savings and better mission support as well as a savings in operating level time required to correct the data.

**ESTIMATED COMPLETION DATE:** Continuing

**ANALYSTS:** William Morgan  
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**TITLE:** *Support for the Development and Implementation of WSMIS*

**CUSTOMER:** HQ AFMC/LGI, MAJCOMs

**OBJECTIVE:** Improve the quality and usefulness of the Weapon System Management Information System (WSMIS) by designing enhancements and solving technical problems. Take an active role in providing assistance to the WSMIS Program Office, the development contractors, and users of the system.

**ANTICIPATED BENEFITS:** Improved accuracy, usefulness, and responsiveness of WSMIS in areas which most need our support. Our technical expertise and operational experience enable us to provide fast, effective corrections and enhancements to the system. Anticipated reductions in contract money will increase the demand for our services.

**ESTIMATED COMPLETION DATE:** Continuing.

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**TITLE:** *What are the Causes of Inactive Inventory*

**CUSTOMER:** HQ AFMC/LGI

**OBJECTIVE:** To determine the causes and magnitudes of varying types of inactive inventory. (Inactive inventory is the new term for any inventory over and above our current or expected need.)

**ANTICIPATED BENEFITS:** By identifying where inactive inventory began appearing and what variables may have changed to cause the problem, we hope to be able to develop processes to help prevent the future occurrence of too much stock on hand.

**ESTIMATED COMPLETION DATE:** 1 MAY 93

**ANALYSTS:** Frederick H. Rexroad  
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### *Distribution and Repair in Variable Environments (DRIVE)*

Our 1993 efforts will continue to support the enhancement and implementation of the DRIVE Production System. The most significant change from previous years is the expectation that DRIVE will be accepted as a joint DoD program under the Joint Logistics Systems Center (JLSC) program management responsibility. Our most immediate working relationship would remain with the expected project manager, HQ AFMC/LGIW.

We rely heavily on periodic report cards from our primary customer as the measure of our success. We will continue to use this method in 1993.

**TITLE:** *DRIVE Technical Support*

**CUSTOMER:** HQ AFMC/LGI, JLSC/MMR

**OBJECTIVE:** We will continue our support of the implementation of DRIVE through our roles as the Air Force technical OPR for the DRIVE model and technical consultant to the DRIVE Functional Integration Office and Program Management Office.

a. Technical Assistance: We will continue to provide technical assistance to evaluate contractor proposals, assess needed analysis efforts, participate in system design efforts and help determine policy and procedural impacts and solutions. DRIVE Studies and Design Support, page 27, outlines some of the efforts planned to support analysis of policy and procedural issues.

b. User support and data analysis: We will continue to support the implementation of DRIVE. Included in this support is assisting the functional OPR and ALC users in understanding why DRIVE produces its recommendations. Findings from these efforts may show DRIVE system shortfalls or may uncover source data system errors. Findings will be provided to the specific system OPR for action. Our support to DeskTop DRIVE is a good example of this activity.

**ANTICIPATED BENEFITS:** DRIVE provides a means of explicitly linking depot support to operational needs. It will prioritize near term depot repair and distribution actions to best support the expected needs of the operational units within the constraints of the corporate Air Force priorities and repair funding. Our involvement will help ensure that the technical solutions for developing and implementing DRIVE are sound and provide a system which meets our customer's desires.

**ESTIMATED COMPLETION DATE:** Continuing

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**TITLE:** *DRIVE Model Maintenance*

**CUSTOMER:** HQ AFMC/LGI/XPS

**OBJECTIVE:** To maintain the production DRIVE model and provide the software for inclusion in the production DRIVE system. We will continue our efforts to ensure that the production model is compatible with Air Force policy, meets the needs of the user and operates efficiently in the production environment. Our most significant 1993 efforts will be:

a. Sub-SRU Changes: We developed an approach to handling lower indentured items, sub-SRUs, in the DRIVE model. We will develop and implement these model changes in 1993 if the necessary changes to the DRIVE system preprocessor are funded.

b. Non-Flying Hour Items: We will modify the model to incorporate items with usage programs based on factors other than flying hours.

**ANTICIPATED BENEFITS:** DRIVE provides a link which will allow the depot to be more responsive to the needs of the field through the allocation of resources to accomplish depot repair and distribution actions. The model is the computational core of this approach. Our model work provides an efficient computation capability and incorporates Air Force supply policy direction.

**ESTIMATED COMPLETION DATE:** Continuing

**ANALYSTS:** Bob McCormick  
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**TITLE:** *DRIVE Studies and Design Activities*

**CUSTOMER:** HQ AFMC/LGI/XPS, HQ USAF/LGS

**OBJECTIVE:** Conduct, or oversee, analysis projects to support DRIVE production system development and implementation. These activities include system software design efforts as well as policy analyses.

a. System Accuracy and Usefulness:

(1) DeskTop DRIVE: We will continue our evaluation of the DeskTop DRIVE system and assist in identifying solutions to any problems.

(2) Air Training Command (ATC): We will provide recommendations to ATC on how best to represent their non-flying location activity in DRIVE. This is follow-on analysis work to the 1992 effort.

(3) Non-PAA Demand Logic: We will review the non-PAA demand logic and work with RAND on their evaluation of this logic.

(4) Asset Data Comparison: We will continue and complete our assessment of the AFMC data system asset data compared to the base level reporting of this same data. Asset data is one of the most critical data elements to the DRIVE computation.

b. Policy analysis: The DRIVE approach to repair and distribution prioritization impacts a number of policies and offers the potential for improvement in AFMC's support to the operational commands. Major efforts will include:

(1) Pro-active SRU support: Previous RAND research has identified the value of maintaining repair part stock in depot repair shops. Production DRIVE can support this goal. Our work will identify alternative approaches.

(2) Backorder release sequence: We will provide an alternative method to the current DRIVE backorder sequencing work planned for inclusion in the D035A system. The goal will be to allow non-Air Force customers to be serviced by UMMIPS while Air Force bases are serviced by DRIVE.

(3) Leveling and Asset Allocation: We will support RAND in their investigation of DRIVE application to these functions. If their work is fruitful, we will participate in system design efforts needed to implement any recommended solutions.

(4) Ogden ALC Distribution Test: We will provide analysis support to assess the use of DRIVE compared to current asset allocation methods.



**ANTICIPATED BENEFITS:** A continuing analysis effort is needed to ensure that DRIVE satisfies the needs of the customer and that its potential is fully exploited by the Air Force. These efforts will help minimize potential design problems and maximize the benefits that can be derived from it. Analysis will assist in the process of continuous improvement.

**ESTIMATED COMPLETION DATE:** Continuing

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**TITLE:** *DRIVE Extensions*

**CUSTOMER:** HQ AFMC/LGI/XPS

**OBJECTIVE:** A number of applications beyond the AFMC production DRIVE system are in-place or are possible candidates for using DRIVE logic. We provide technical support to many of these related efforts.

a. **Redistribution:** A redistribution model, based on RAND and XPS model work, is now included in the PC DRIVE application system. At least one MAJCOM, PACAF, is assessing the value of this tool for proactive lateral supply. We will assist in model checkout and analysis tasks as needed.

b. **Model Support:** We will continue to provide modeling support for the DRIVE application known as TRADES, AFMC Detachment 35 operation at Kadena AB, and DeskTop DRIVE (Windows based PC environment).

c. **JLSC:** We will continue our interchange with the other components to share technical information on DRIVE and lessons learned from our respective implementations of DRIVE. Our goal will be to assist in a joint design which meets the requirements of all participating components.

d. **CORONET DEUCE:** We will continue to provide technical consultation on the use of DRIVE in CORONET DEUCE and provide model changes as needed. The main thrust of this effort will be in 'debugging' the DeskTop DRIVE implementation and in performing analysis of the DRIVE Distribution Test at Ogden ALC. We will translate lessons learned from this exercise into the DRIVE production system data usage and model logic.

**ANTICIPATED BENEFITS:** The benefits of DRIVE concepts will be expanded through the implementation of these projects or lesson learned. The benefits will consist of increased readiness and sustainability, greater logistics flexibility and responsiveness to operational needs.

**ESTIMATED COMPLETION DATE:** Continuing

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**TITLE:** *Readiness Based Initial Requirements Determination (RBIRD)*

**CUSTOMER:** AFSAC, OO-ALC/LAIM

**OBJECTIVE:** Apply readiness-based sparing (RBS) to foreign military sales.

**ANTICIPATED BENEFITS:** Inventory reduction, spares cost savings, and improved aircraft availability are benefits of a readiness-based computation (RBS).

Last year we developed and delivered to HQ AFMC/LGI a prototype RBIRD to demonstrate that marginal analysis can be used for Air Force provisioning. This year we were asked to adapt this technique to calculate spares quantities for foreign military sales. We will enhance the capabilities of RBIRD by using the Aircraft Sustainability Model (ASM) for the spares calculation. ASM offers many useful features, such as cannibalization modeling, multiple levels of indenture, base-depot tradeoffs, and greater efficiency. The Air Force has been using ASM for several years to compute spares for war. It is also fully compatible with the Air Force's peacetime spares computation system (D041).

A special version of RBIRD, with appropriate headings and data terms, will be developed to accommodate this application. It will be tested by OO-ALC/LAIM.

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## **THE CONCEPT DEVELOPMENT FUNCTION**

### **INTRODUCTION**

The Concept Development Function, XPSC, contributes to the goals of the Management Sciences Division in three functional areas: Conducting studies, developing and using computer models, and providing technical support to the staff.

In the studies role, XPSC conducts studies and assists other AFMC staff agencies in improving logistics policies and procedures, particularly in pipeline management areas for aircraft engines. In doing the study and study support tasks, it is often necessary to use computer models to describe relationships and constraints within the logistics processes and to forecast what is likely to happen in the future or under different circumstances.

XPSC develops and/or uses models such as JEMS (Jet Engine Management Simulator), OMENS (Opportunistic Maintenance Engine Simulator), SORCE (Simulation of Removals of Components and Engines), Air Freight Terminal Simulation models, Depot Repair Model, the Floating Stock Model, the JEIM Engine Flow Days Model, the Propulsion Decision Support System, RADM (Resource Allocation Decision Model), and MOD-METRIC. These models support simulations and analyses for our projects as well as for various other staff elements. In addition, we develop prototype data bases and analysis programs to support our studies and models.

In our technical assistance role, we help other staff offices and agencies in using models and mathematical and statistical techniques on a wide variety of topics and short term tasks. Much of this is done informally by phone, in meetings, or as a member of a working group.

We have a staff of eight analysts, most of whom have advanced degrees in technical areas such as operations research, mathematics or engineering. Each analyst tends to specialize in some major area of logistics management.

### **ACCOMPLISHMENTS IN 1992**

During 1992 we worked on a number of aircraft engine and module projects, on helping to define and establish command level measures (METRICs) that the AFMC Commander could use to monitor Command activity, and on performing a number of consulting type taskings for functional offices within the Headquarters.

We started the year with 6 projects that were carried over from 1991. We added 7 more during 1992 and closed 5. At the end of the year we carried 8 active projects over into 1993.

Projects carried over from 1991 included Engine Pipeline Study, Support to the D028 Central Leveling System, Demand Forecasting, Maintain/Apply Models, Compressed Work Week, and Sun Workstations.

Projects begun during 1992 included AFMC METRICs Working Group, XP Posture Planning Working Group, Sustaining Engineering, Statistical Sampling for the Library, AFMC Models & Simulations (M&S), Actuarial Process Consolidation and Review, and How Malfunction Code Reduction.

Projects closed during the year were Demand Forecasting, AFMC METRIC Working Group, XP Posture Planning Working Group, Sustaining Engineering, and Compressed Work Week.

Projects continuing into 1993 included Engine Pipeline Studies, Support to the D028 Central Leveling System, Maintain/Apply Models, Sun Workstations, Statistical Sampling for the Library, AFMC Models & Simulations, Actuarial Process Consolidation and Review, and How Malfunction Code Reduction.

The following writeups will summarize some of the more important projects and taskings.

**TITLE:** *Engine Pipeline Study*

**CUSTOMER:** HQ AFMC/XRCS

**OBJECTIVES:**

1) To provide the Management System Team, AFMC/XRCS, the necessary information to update the peacetime and wartime standard pipeline times for propulsion engines for pipeline segments included in the spares computation.

2) To develop new engine pipeline reports encompassing all of the pipeline segments for both repairable and serviceable conditions.

3) Continue to support the CEMS (Comprehensive Engine Management System) programmers in implementing the changes to the current system as proposed in the Baseline Change Request (BCR) to the CEMS system.

**RESULTS:**

1) We submitted Changes 1 and 2 for the Baseline Change Request (BCR), along with additional clarification to the CEMS programmers for their use in implementing the prototype system onto CEMS. Progress has been slow due to higher priority work by the

CEMS programmers.

2) AFMC/XPSC developed new engine pipeline reports, covering the Base Repair, Retrograde, Depot Repair, Resupply, and Base and Depot Serviceable pipeline cycles. AFMC/XPSC sent examples of these reports, developed using 18 months of CEMS data, to command engine managers for their review and comments. The new pipeline reports were briefed to the 1992 Propulsion Managers Conference (PMC).

3) The prototype data system on the CREATE computer system generated data as part of a study for AFMC/LGTX to determine if transportation standards are being met in the shipment of engines in both the retrograde and resupply cycles. Preliminary findings show that the actual transportation times meet the UMMIPS standards.

This project began prior to 1992 and will continue into 1993.

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**TITLE:** *Demand Forecasting*

**CUSTOMER:** HQ AFMC/LGI.

**OBJECTIVES:** To determine how the D041 Depot OIM demand forecasts are made for requirements and to examine how well we are forecasting. Also, to use this data to try to improve procedures for maintaining and developing D041 factors.

**RESULTS:** The Final Report had been provided to LGI near the end of CY 91, and follow-up actions continued into CY 92. Thirty-five copies were given to LGI for distribution throughout the command.

This project was started prior to 1991 and was completed in Jan 92.

LGI is working with us to define a follow-on project to continue some of the investigations begun during this project.

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**TITLE:** *Support to the D028 Central Leveling System*

**CUSTOMER:** HQ AFMC/LGI

**OBJECTIVES:** Provide technical support for the running and updating of the D028 Central Leveling System. Maintain a research version of the D028 algorithm on CREATE.

**RESULTS:** During 1992, the following tasks were accomplished:

- 1) Provided D028 user history data to the Air Force Audit agency (AFAA).
- 2) Provided copies of the D028 algorithm to the JLSC Community.
- 3) Assisted SA-ALC/ASCOID in the restart of D028 processing.
- 4) Gave an overview of "How D028 Works" to the JLSC Mathematical Model Group.
- 5) Briefed the procedures used to calculate the Daily Demand Rate (DDR) used in the D028 algorithm to the JLSC Mathematical Model Group.
- 6) Provided WR-ALC user history data for a selected number of stock numbers to Softech.
- 7) Provided the AFAA with SA-ALC D028 user history data by SRAN.
- 8) Provided assistance to the AFAA to explain the process used to develop the D028 Push Level.
- 9) Combined the 1992 D028 history data.
- 10) Validated the change in user Expected Backorder Field in the algorithm.

This project started prior to 1992 and will continue into 1993 to support the D028 customer and the users of the history file as needed.

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**TITLE:** *Maintain and Apply Models.*

**CUSTOMERS:** Various HQ AFMC activities, ALCs, and MAJCOMs

**OBJECTIVE:** To maintain models that we have developed or acquired and to assist potential users in applying them to study, improve, and resolve USAF issues.

**RESULTS:**

1) Depot Repair Model (Floating Stock Model). This model was produced by XPSC to assist in developing and implementing improved methods for computing floating stocks for the depot repair of aircraft engines and modules.

In early 1992, SA-ALC/LPF-AEMT requested that XPSC run the model for the engine modules, F100 Inlet Fan and the F100 Core. XPSC provided the results to LPF-AEMT which showed a significant reduction in the depot flow days to repair the module when a relatively small investment was made in the floating stock for the repair parts. LPF-AEMT used the information as a basis to request an application of the model at the SA-ALC depot repair facilities.

SA-ALC/LPF-AEMT later requested our assistance in making additional model runs in support of a 15-month service test on the engine module, F100-PW-24BA High Pressure Core (HPC), and its longest repair flow time job-routed components. Work on this tasking began in Mar 92 and will continue into 1993.

2) OMENS (Opportunistic Maintenance Engine Simulation). In Sep 92, two AFIT students were provided information about the model for use in their Logistics Models for Policy Decision Course.

3) JEMS (Jet Engine Management Simulation). In May 92, the JEMS model was evaluated by XRPA for possible use in an Engine Two-Levels of Maintenance Study. Copies of a similar study done by XPSC using JEMS in 1987 for the C-17 SPO concerning the F117 engine were given to XRPA. Work on this model will continue into 1993 when plans are to convert it for use with the new Sun Workstations.

4) MOD-METRIC. In Jan 92, the F-16 System Program Office requested copies of MOD-METRIC, Dyna-METRIC, and the Readiness Based Sparing Model be given to Lockheed in connection with a contract.

In Feb 92, SA-ALC requested that we boost the MOD-METRIC limit from 30 bases to 50 bases for the CREATE mainframe model. The model was modified in Apr 92 to raise the limit to 80 bases instead of 50. Some problems surfaced in May 92 with the CREATE version. After much debugging the problem was identified as a compiler fault. The compiler problem was fixed in Jun 92 as a result of our efforts.



In Apr 92 SA-ALC requested that the PC version of MOD-METRIC also be modified to increase the base limits to 80. The compiled and updated model code were provided to SA-ALC in May 92.

In Jul 92, the maintenance of the MOD-METRIC model was transferred from XPSC to XPSA due to the PCS transfer of Capt Carol Weaver.

5) This project to maintain and apply models will continue into 1993.

**ANALYSTS:** Mr Tom Stafford  
Mr Harold Hixson  
Mr James S. Bankey  
Mr Phil Persensky  
(513) 257-7408; DSN 787-7408

**TITLE:** *Sun Work Stations.*

**CUSTOMER:** HQ AFMC/XPS

**OBJECTIVES:** To acquire, install, and maintain a Sun Workstation with 4 terminals in XPS to provide the computing power currently being provided by the CREATE system.

**RESULTS:** The CPU and terminals were received, tested, and accepted. Part of the software was received. The equipment was not operational as of the end of the year.

Work on this tasking began prior to 1992 and will continue into CY 93 to complete installation of the system software and to bring the system on line.

**ANALYSTS:** Mr James S. Bankey  
Mr Harold Hixson  
(513) 257-7408; DSN 787-7498

**TITLE:** *Support to AFMC METRICs Working Group*

**CUSTOMER:** HQ AFMC/XPX

**OBJECTIVES:** Provide support to a Working Group chaired by XPX. Facilitate METRICs (performance measures) development in the combined (AFLC/AFSC) Command to measure how well AFMC meets anticipated customer needs. Be responsible for publication of a policy letter for METRICs and the publication of a METRICs Handbook.

**RESULTS:** A criteria of what constitutes a good METRIC was developed. From this criteria, a form was created to "evaluate" incoming METRICs developed by the Functional areas. Approved METRICs have been presented and reviewed at several HORIZONS meetings. Now that the program is established, XPX has taken over the day-to-day operations with a totally internal team.

The project started in Jan 92 and was completed in Nov 92.

**ANALYSTS:** Mr John Madden  
Mr Don Casey  
Mr Freddie Riggins  
(513) 257-7408; DSN 787-7408

**TITLE:** *XP Posture Planning Review Team.*

**CUSTOMER:** HQ AFMC/XPX

**OBJECTIVE:** To participate in a comprehensive review of the Plans and Programs Directorate, XP, organizations and processes to ascertain whether its current posture can be improved to better serve our customers.

**RESULTS:** XPS provided one person to work with the team. The team conducted brainstorming sessions, developed a list of XP unique functions, defined each Division's "immutable macro processes", forecast future macro trends for AFMC and XP, identified XP core processes, identified core processes to retain, and grouped core processes into XP Core Function Groupings. Results became a part of an XP Restructure Plan.

This task was started in Jun 92 and completed in Sep 92.

**ANALYSTS:** Mr John L. Madden  
Mr Vic Presutti  
(513) 257-7408; DSN 787-7408.

**TITLE:** *Sustaining Engineering.*

**CUSTOMER:** HQ AFMC/XRIA

**OBJECTIVE:** To study the applicability of Sustaining Engineering in the Air Force. This tasking was further defined to assess the impact of Sustaining Engineering on weapon system performance and support by establishing a Measure of Effectiveness for Sustaining Engineering.

**RESULTS:** A memo was sent to XRIA presenting a proposed Measure of Effectiveness for Sustaining Engineering.

In general, it is not known what the problem is or what should be done until a Sustaining Engineering project has been accomplished. This makes it difficult to prepare adequate justification, except in very general terms, for a Plan for Sustaining Engineering (PSE) prior to its execution. The problem area could involve a number of different factors and could result in a solution involving one of more of the following actions:

- a. Software changes
- b. Mod Program
- c. Preferred Spares Program
- d. Improved Item Replacement Program
- e. Change in maintenance procedures

In most cases, Sustaining Engineering funds (EEIC 583) are only "seed" money and funds from one or more of the areas cited in a. thru e. above are also required in order for the desired improvement to be accomplished. Therefore, savings and benefits which result from "Sustaining Engineering" efforts are the results of the composite (EEIC 583 and mod, preferred spares, etc.) funds that were expended. This makes it essential that good record keeping practices be established and maintained.

Since each PSE identifies a unique workload, it is difficult to establish a single factor which would measure all cases. It was recommended that a procedure be established for each Plan for Sustaining Engineering (PSE) to document:

- a. EEIC 583 money requested/spent, by year
- b. Follow-on funds (preferred spares, improved item replacement program, mods, etc.) which impact on each PSE, by year.
- c. The "improvements" (by year) obtained through EEIC 583 and follow-on funding. These should be described as quantitatively as possible in terms of dollars, MTBF, etc. Blanket benefit statements such as, "An F-111 aircraft and crew would have been lost", should be avoided unless very clear evidence exists to support the fact that such a catastrophe was actually averted.

The data collected above would be used to display a metric as follows:

$$\text{Return On Investment} = c. / (a. + b.)$$

$$= \text{"improvements"} / (\text{sum of} \\ \text{Money requested} + \text{follow-on funds, etc.})$$

It is understood that there may be cases where the data needed for the above metric might not be available and a narrative justification of benefits would be required. However, the intent should be to hold the number of such cases to an absolute minimum.

This tasking was started in May 92 and completed in Dec 92.

**ANALYST:** Mr Don Casey  
(513) 257-7408; DSN 787-7408

**TITLE:** *Statistical Sampling of Library Usage*

**CUSTOMER:** HQ AFMC/MWPL

**OBJECTIVE:** To determine an appropriate sampling method to use for collecting statistics on the number of people using AFMC libraries and the number of various types of resources which are checked out.

**RESULTS:** Historical data from libraries at each AFMC Air Logistics Center were analyzed to determine the number of patrons and categories of resources used during each day of the week. Several sampling plans were developed to enable the libraries to determine annual usage figures for their facility rather than the 100% data recording that was currently done. Charts were prepared to illustrate the results that would have occurred had each sampling plan been used on the historical test data. They were briefed to the customer and a specific sampling plan was selected. This phase of the tasking was completed in Jul 92.

Action is underway to establish a standard spreadsheet template for all AFMC libraries. Each library will input its sample data into a PC and the spreadsheet will perform the necessary calculations to produce the information required to be included in Command/USAF directed reports.

This tasking began in Feb 92 and will continue into CY 93.

**ANALYSTS:** Capt Carol Weaver  
Mr Don Casey  
Mr James S Bankey  
(513) 257-7408; DSN 787-7408

**TITLE:** *AFMC Models & Simulations (M&S)*

**CUSTOMERS:** HQ AFMC/XP, XR(OAS), XRX; USAF/LG

**OBJECTIVES:** To maintain cognizance of models and simulations applicable to or used by AFMC activities, to provide technical guidance on modeling and problem solving, and to participate in various working groups on modeling.

**RESULTS:**

1) Models Survey for Office of Aerospace Studies, OAS.

In May 92 we were asked by HQ AFSC/XR(OAS), Kirtland AFB, NM, to help them update their draft Models and Simulations Handbook by conducting a survey of AFLC to identify the models and the functions they support in Phase IV, Operations and Support, of weapons system development processes.

A listing of all the models then in use for AFLC organizations, except for Financial Management, was developed and descriptions of each model were written by XPSC. The package covering 13 models and a cross-reference to a new (1992) DOD Wargames / Simulation Catalog were sent to OAS on 21 May 92.

A data base system was created by XPSC to allow for rapid extracts of information about the models when needed. The file was expanded to include more information about acronyms, names, what the model says, what it does, how we use it, whether it is implemented or is a research version, whether math or monte carlo, simple or detailed. The expanded list was made available to the Scientific Advisory Board on 19 Jun 92.

2) AF Analyses, Models & Simulations (M&S) Review.

XPSC participated on a review team headed by USAF/LGX to determine information about models used by AFMC in the Production and Logistics processes. The team consisted of representatives from HQ AFMC/XPS, ENM, LGDE, XRX, XRS and from AL/HRGO, WL/MT, and HQ USAF/LGX. The team met at HQ AFMC on 10-13 Nov 92. Discussions were held and information gathered about models used, suggested organizational placement for an M&S office in the Air Force, and investments and costs. This information was put into a paper and a briefing as the Production and Logistics Panel's report which LtCol Daniel Kolpin, USAF/LGX, presented to the Senior Leadership at USAF. This was one of eight panel briefings involved in the total AF Analysis, M&S Review. Work on this tasking occurred in Nov and Dec 92.

During Nov and Dec 92 XPSC also maintained contact with another panel under the same tasking as above: the Research and Development Team, headed by HQ AFMC/XRX.

### 3) Command Decision Support Process.

In Jul 92, XPSC was tasked by HQ AFMC/XP to become familiar with decision support models that are available or have been used by the Services or by Industry, and to assist the HQ AFMC staff in making major decisions by providing technical guidance on modeling and on problem solving.

Several models have been reviewed and assessed for possible value to AFMC decision making.

Technical assistance was provided to HQ AFMC/XPM, Manpower, in getting SA-ALC's Resource Allocation Decision Model (RADM) debugged and running on HQ AFMC computers, and in developing software to provide special summaries and displays not available from the SA-ALC version of the model. We also helped XPM use the RADM model to address XP Restructuring issues.

A survey of 'macro' decision support models was conducted for XP.

A Depot Macro Analysis Program was obtained from the Defense Logistics Agency and is being adapted for use with AFMC depots.

This tasking began in Jul 92 and will continue into 1993.

ANALYSTS: Mr John L. Madden  
          Mr Don Casey  
          Mr James S Bankey  
          (513) 257-7408; DSN 787-7408

**TITLE:** *Actuarial Process Consolidation and Review*

**CUSTOMER:** HQ AFMC/XRCS

**OBJECTIVES:** To consolidate and formalize the actuarial process from the current separate, non-standard systems onto a single, standard system. The primary need for this action is to support the engine distribution and overhaul requirements computations that are being automated on the Propulsion Requirements System (PRS). Included in this project is the goal to review the current actuarial process and to establish standard forecasting procedures to be used by both SA-ALC and OC-ALC.

**RESULTS:** AFMC/XRCS submitted a CSRD to CEMS analysts at OC-ALC/TILC to consolidate the current actuarial procedures onto a single sub-system of the Comprehensive Engine Management System (CEMS). XPSC served as a facilitator between the propulsion actuaries at OC-ALC/LPA and SA-ALC/LPF in the consolidation of the systems.

Our analyst began work on this tasking in May 92 and the tasking will continue into 1993.

**ANALYST:** Mr Tom Stafford  
(513) 257-7408; DSN 787-7408

**TITLE:** *How Malfunction Code Reduction*

**CUSTOMER:** HQ AFMC/XRCS

**OBJECTIVES:** To reduce the number of propulsion How Malfunction (HOWMAL) Codes while providing improved data integrity for the users of this data. To coordinate the implementation of the new codes with the computer system OPRs (i.e., CAMS, REMIS, CEMS) and users (e.g., actuaries) to determine when the new codes will take effect.

**RESULTS:** HQ AFMC/XRCS submitted a CSRD stating the requirement to system OPRs. The users of the data have been notified to begin modification of their programs to utilize the new data. At the end of 1992, the computer system OPRs were reviewing the CSRD to determine the amount of modification that will be required and the time required to complete the necessary changes.

Work on this task began in Aug 92 and will continue into 1993.

**ANALYST:** Mr Tom Stafford  
(513) 257-7408; DSN 787-7408



## **THE PROGRAM FOR 1993**

During 1993 and beyond we expect to continue to support the staff and our other customers in conducting studies, developing and applying computer models, and providing technical support. The primary focus during 1993 will be on studies related to aircraft engine management. We will assist AFMC/XRCA in completing and implementing the redesign of the aircraft engine pipeline analysis system, and will work on developing better analysis techniques for engine management.

The following projects and taskings are not listed in priority order.

**TITLE:** *Engine Pipeline Study*

**CUSTOMER:** HQ AFMC/XRCS

**OBJECTIVES:**

1) To provide the Management System Team, AFMC/XRCS, the necessary information to update the peacetime and wartime standard pipeline times for propulsion engines for pipeline segments included in the spares computation.

2) To develop new engine pipeline reports encompassing all of the pipeline segments for both *reparable* and *serviceable* conditions.

3) Continue to support the CEMS (Comprehensive Engine Management System) programmers in implementing the changes to the current system as proposed in the Baseline Change Request (BCR) to the CEMS system.

**ANTICIPATED BENEFITS:** The improved engine pipeline reports will assist managers in establishing new, and assessing current pipeline standards. The approved standards will be applied in spare engine stock level computations. The standards will also be used as benchmark values to compare with actual experience displayed in CEMS pipeline reports. The standards will provide direct benefits of more accurate spare engine requirements.

**ESTIMATED COMPLETION DATE:** This project has been active several years and no completion date has been set.

**ANALYST:** Mr Tom Stafford  
(513) 257-7408; DSN 787-7408

**TITLE:** *Support to the D028 Central Leveling System*

**CUSTOMER:** HQ AFMC/LGI

**OBJECTIVES:** Provide technical support for running and updating the D028 Central Leveling System. Maintain a research version of the D028 algorithm on CREATE.

**ANTICIPATED BENEFITS:** Have a data base readily available for doing special studies and to do data analysis. Provide technical expertise for resolving D028 problems that may surface and for D028 updates. Have a version of the D028 algorithm available for testing improvements and updates to the algorithm.

**ESTIMATED COMPLETION DATE:** Continuing.

**ANALYST:** Mr Freddie Riggins  
(513) 257-7408; DSN 787-7408.

**TITLE:** *Statistical Analysis for the Personnel Office*

**CUSTOMER:** HQ AFMC/DPU

**OBJECTIVE:** Develop a plan to evaluate data supplied by DPU to determine whether significant differences exist among the data.

**ANTICIPATED BENEFITS:** DPU will have statistical confidence in the meaning of their existing personnel training data and will be aware of any significant areas that need further management attention. This project will analyze currently existing data and establish a procedure for DPU use in performing their own analyses in the future.

**ESTIMATED COMPLETION DATE:** This new tasking started in Jan 93 and will be completed in 1993.

**ANALYSTS:** Mr Don Casey  
Lt Robert Block  
(513) 257-7408; DSN 787-7408

**TITLE:** *Maintain and Apply Models*

**CUSTOMERS:** Various HQ AFMC offices, ALCs, and MAJCOMs

**OBJECTIVES:** To maintain models that we have developed or acquired and to assist potential users in applying them in studying, improving, and resolving USAF issues. To convert these models from the CREATE system to the in-house Sun Workstations system.

**ANTICIPATED BENEFITS:** Anticipated benefits by model are:

1) Depot Repair Model (Floating Stock Model).

This model gives maintenance and item managers the capability to compute floating stock level options for repair parts and to relate them to the higher assembly depot repair flow times that would result from each option. It also identifies the costs of parts and higher assemblies required to fill the repair pipelines in depot repair shops as a result of the floating stock options being considered. In many cases, significant reduction in higher assembly flow days and resultant reduction in the number of higher assemblies tied up in the maintenance process can result from a relatively small investment of parts used to repair the higher assembly.

2) JEMS (Jet Engine Management Simulator).

This model allows the user to answer a variety of readiness assessment type questions relating to adequacy of engine support and repair capabilities in both peace and wartime scenarios.

3) OMENS (Opportunistic Maintenance Engine Simulator).

Substantial reductions in spare engine and module requirements are achieved because of improved factors produced by the optimal opportunistic maintenance parts replacement policies devised through the use of this model.

**ESTIMATED COMPLETION DATE:** Continuing.

**ANALYSTS:** Mr Tom Stafford  
Mr Harold Hixson  
Mr James S Bankey  
(513) 257-7408; DSN 787-7408

**TITLE:** *AFMC Models & Simulations (M&S)*

**CUSTOMERS:** HQ AFMC/XP, XR(OAS), XRX; USAF/LG

**OBJECTIVES:** To maintain cognizance of models and simulations applicable to or used by AFMC activities, to provide technical guidance on modeling and problem solving, and to participate in various working groups on modeling.

To become familiar with decision support models that are available or have been used by the Services or Industry, and to assist the HQ AFMC staff in making major decisions by providing technical guidance on modeling and problem solving.

To continue to provide technical assistance to XPM in using the Resource Allocation Decision Model (RADM) in manpower and resource allocation studies.

To continue to explore the feasibility and desirability of adding a depot maintenance capability to DLA's Depot Macro Analysis Program. The Defense Logistics Agency had developed a "quick reaction" strategic depot assessment model that can be used to evaluate alternate depot location decisions. However, it treated depots only as materiel storage and distribution sites and did not cover a depot maintenance capability.

To continue to work with HQ AFMC/XRX on their inventory of AFMC Models & Simulations.

**ANTICIPATED BENEFITS.** The use of Modeling and Simulation is on the ascendancy in the DOD and USAF. It is essential that AFMC keep current on modeling and simulation applications in the Command, and that applications be identified, developed, and improved throughout the Command.

**ESTIMATED COMPLETION DATE:** Continuing.

**ANALYSTS:** Mr John L. Madden  
Mr Don Casey  
Mr James S Bankey,  
(513) 257-7408; DSN 787-7408

**TITLE:** *Sun Work Stations.*

**CUSTOMER:** HQ AFMC/XPS

**OBJECTIVES:** To complete installation and testing of the system software, to bring the CPU and 4 work stations on line, and to maintain the system once operating.

**ANTICIPATED BENEFITS.** We will be able to do all of our model building and application runs, and to maintain all our data bases on this system without having to continue to use the CREATE system, which is being phased out.

**ESTIMATED COMPLETION DATES:** .

Work on this tasking began in 1991.

Installation and testing will be completed by 1 Sep 93.

System maintenance will continue throughout 1993.

**ANALYSTS:** Mr James S. Bankey

Mr Harold Hixson

(513) 257-7408; DSN 787-7498

**TITLE:** *Actuarial Process Consolidation and Review*

**CUSTOMER:** HQ AFMC/XRCS

**OBJECTIVES:** To consolidate and formalize the actuarial process from the current separate, non-standard systems onto a single, standard system.

**ANTICIPATED BENEFITS:** The primary need for this action is to support the engine distribution and overhaul requirements computations that are being automated on the Propulsion Requirements System (PRS). Included in this tasking is the goal to review the current actuarial process and to establish standard forecasting procedures to be used by both SA-ALC and OC-ALC.

**ANTICIPATED COMPLETION DATE:** This tasking began prior to 1992 and no completion date has been set.

**ANALYST:** Mr Tom Stafford

(513) 257-7408; DSN 787-7408

**TITLE:** *How Malfunction Code Reduction*

**CUSTOMER:** HQ AFMC/XRCS

**OBJECTIVES:** To reduce the number of propulsion How Malfunction (HOWMAL) Codes while providing improved data integrity for the users of this data. To coordinate the implementation of the new codes with the computer system OPRs (i.e., CAMS, REMIS, CEMS) and users (e.g., actuaries) to determine when the new codes will take effect.

**ANTICIPATED BENEFITS:** Improved capability to identify which repair part removals and repair actions were the result of failure (usage, or pre-mature removal) or of management-directed actions will enhance the accuracy of actuarial failure rates and other removal rate factors. This in turn will result in better forecasts of engine and module removal rate factors resulting in more accurate maintenance forecasts and spares requirements computations.

**ESTIMATED COMPLETION DATE:** This tasking began in Aug 92. No completion date has been set.

**ANALYST:** Mr Tom Stafford  
(513) 257-7408; DSN 787-7408

**TITLE:** *Statistical Analysis for the Personnel Office*

**CUSTOMER:** HQ AFMC/DPU

**OBJECTIVE:** Develop a plan to evaluate data supplied by DPU to determine whether significant differences exist among the data.

**ANTICIPATED BENEFITS:** DPU will have statistical confidence in the meaning of their existing personnel training data and will be aware of any significant areas that need further management attention. This project will analyze currently existing data and establish a procedure for DPU use in performing their own analyses in the future.

**ESTIMATED COMPLETION DATE:** This new tasking started in Jan 93 and will be completed in 1993.

**ANALYSTS:** Mr Don Casey  
Lt Robert Block  
(513) 257-7408; DSN 787-7408

**TITLE:** *Demand Forecasting*

**CUSTOMER:** HQ AFMC/LGI

**OBJECTIVE:** To extend the study, Evaluation of Aircraft Spares Demand Forecasting, completed in 1991 by Capt Carol Weaver, to do the following:

- 1) Extend the data base by adding 2 more years of history
- 2) Quantify statistical forecast accuracy
- 3) Investigate the volatility of the underlying process
- 4) Compare forecast error distributions using 12 quarter vs 8 quarter moving averages.

**ANTICIPATED BENEFITS:** Improved demand forecasting will increase the accuracy of recoverable spares requirements computations and will aid in the development of a "reliability operations maintenance engineering" (ROME) approach being developed by the customer to support maintenance planning by the IWSM (Integrated Weapon System Manager).

**ESTIMATED COMPLETION DATE:** Potential project. LGI is working with us to define a follow-on project to continue some of the investigations from the study, Evaluation of Aircraft Spares Demand Forecasting, by Capt Carol Weaver, 1991.

No completion date has been established.

**ANALYST:** None assigned to date.



**JOHN L. MADDEN**  
Concept Development  
Management Sciences Division

## ACRONYMS

AAPM	Aircraft Availability Procurement Model
ACC	Air Combat Command
ACIM	Availability Centered Inventory Model
AFAA	Air Force Audit Agency
AFIT	Air Force Institute of Technology
AFLMA	Air Force Logistics Management Agency
AFMC	Air Force Materiel Command
AFWC	Air Force Wargaming Center
AIM	Alternatives to Intermediate Maintenance
ALAM	Airlift Logistics Assessment Model
ALC	Air Logistics Center
ALT	Administrative Leadtime
AMC	Air Mobility Command
APU	Auxiliary Power Unit
ASM	Aircraft Sustainability Model
ATC	Air Training Command
AWM	Awaiting Maintenance
AWP	Awaiting Parts
BCR	Baseline Change Request
BLSS	Base Level Self-Sufficiency Spares
C-Ratings	Combat Ratings
CAIG	Cost Analysis Improvement Group
CAMS	Core Automated Maintenance System
CEMS	Comprehensive Engine Management System
CIM	Corporate Information Management
COBRA	Cost of Base Realignment Actions
CPU	Central Processing Unit
CREATE	An AFMC Scientific Computer System
CSE	Common Support Equipment
CSF	Critical Success Factor
CSMS	Combat Supplies Management System
CSRD	Comm-Computer Systems Requirement Document
CWW	Compressed Work Week
DDR	Daily Demand Rate
DFIO	DRIVE Functional Integration Office
DLA	Defense Logistics Agency
DLSIE	Defense Logistics System Information Exchange
DMAS	Dyna-METRIC Microcomputer Analysis System
DMIF	Depot Maintenance Industrial Fund
DMMIS	Depot Maintenance Management Information System
DMRD	Defense Management Review Decision
DMSC	Depot Maintenance Support Center
DOD	Department of Defense



DR	Deficiency Report
DRC	Dynamics Research Corporation
DRCQ	Depot Repair Cycle Quantity
DRIVE	Distribution & Repair in Variable Environments
EA	Executive Agent
EEIC	Element of Expense Investment Code
EIS	Executive Information System
EMS	Enhanced Multi-Echelon System
ENMCS	Engine Not Mission Capable - Supply
EOQ	Economic Order Quantity
ERO	Engine Review Organization
FAMMAS	Funding/Availability Multi-Method Allocator for Spares
FMS	Foreign Military Sales
GWAM	Get Well Assessment Module
HOWMAL	How Malfunction
IM	Item Manager
IMDE	Integrated Model Development Environment
IMP	Inventory Management Program
IOC	Initial Operation Capability
IRD	Initial Requirements Determination
IRP	Inventory Reduction Plan
IWSM	Integrated Weapon System Management
JEIM	Jet Engine Intermediate Maintenance
JEMS	Jet Engine Management Simulator
JLSC	Joint Logistics System Center
LAMs	Logistics Assessment Models
LMI	Logistics Management Institute
LMS	Logistics Management System
MAJCOM	Major Command
MDS	Mission Design Series
METRICs	Command Measures of Performance
MIC	Maintenance Inventory Center
MICAP	Mission Capability
MOD-METRIC	Modified Multi-Echelon Technique for Recoverable Item Computations
M&S	Models & Simulations
MSOR	Multiple Sources of Repair
MTBD	Mean Time Between Demands
MTBF	Mean Time Between Failure
NIIN	National Item Identification Number
NSN	National Stock Number
O&ST	Order and Ship Time
OCM	On Condition Maintenance
OIM	Organizational Intermediate Maintenance
OMENS	Opportunistic Maintenance Engine Simulator
OPR	Office of Primary Responsibility

OSD	Office of the Secretary of Defense
OWLP	Overseas Workload Program
PA	Program Authority
PAA	Primary Aircraft Authorized
PACAF	Pacific Air Forces
PAT	Process Action Team
PC	Personal Computer
PLT	Production Leadtime
PMC	Propulsion Manager's Conference
PMO	Program Management Office
POM	Program Objective Memorandum
PPBS	Planning, Programming and Budgeting System
PRS	Propulsion Requirements System
PSE	Plan for Sustaining Engineering
RADM	Resource Allocation Decision Model
RBIRD	Readiness Based Initial Requirements Determination
RBS	Readiness Based Sparing
RDB	Requirements Data Bank
REALL	Reallocation Module
REALM	Requirements/Execution Availability Logistics Module
REMIS	Reliability & Maintainability Information System
RIPIT	Requirements Interface Process Improvement Team
RIT	Reparable in Transit
ROME	Reliability Operations Maintenance Engineering
RSP	Readiness Spares Package
SAM	Sustainability Assessment Module
SB&CR	Stock Balance and Consumption Report
SBSS	Standard Base Supply System
SC&D	Stock Control and Distribution
SCS	Stock Control System
SESAME	Selected Essential Item Stockage for Availability Method
SFDLR	Stock Funding of Depot Level Repairables
SMG	Supply Management Group
SORCE	Simulation of Removals of Components & Engines
SPD	System Program Director
SRAN	Stock Record Account Number
SRU	Shop Replaceable Unit
STOM	Supply to Maintenance
SWAP	Spares Wartime Assessment Procedure
TASC	The Analytical Sciences Corporation
TLAM	Tactical Logistics Assessment Model
TLM	Two Level Maintenance
TNMCS	Total Not Mission Capable - Supply
TQM	Total Quality Management
TRADES	Theater Repair & Distribution Execution System

UMMIPS	Uniform Materiel Movement & Issue Priority System
WRM	War Readiness Materiel
WRSK	War Readiness Spares Kit
WSAM	Weapon System Availability Model
WSMIS	Weapon System Management Information System
WSRAR	Weapon System Program Assessment Review

# Distribution List

HQ AFMC		ALCs			
CC	1	OC-ALC/FM	1	AIR UNIVERSITY/EC	1
CV	1	OO-ALC/FM	1		
CS	1	OO-ALC/LAIM	1	DTIC	2
CI	1	SA-ALC/FM	1		
DPU	1	SA-ALC/LAAR	1	DLSIE	2
EN	1	SM-ALC/FM	1		
FMB	1	WR-ALC/FM	1	Army Studies Prog Mgmt	
FMC	1	AGMC/FM	1	Ofc (DSCS/DMO)	1
HO	1				
IG	1	AF SAC/CC	1	Army Inventory Research	
LG	1			Ofc, Philadelphia PA	1
LGD	1	OO AL HSC/			
LGI	5	HRG	1	US Navy Studies Mgmt	
LGM	1			Ofc (OP-916)	1
LGP	1	JLSC			
LGS	1	MMR	1	RAND Corp.	1
LGT	1				
LGW	1	HQ USAF		LMI	1
MWPL	1	LGS	1		
PA	1	LGX	1		
PK	1	XOO	1		
ST	1				
XP	1	AFAFC/CC	1		
XPD	1	AFLMA/CC	1		
XPM	1	AFSAA/SA	1		
XPO	1				
XPS	50	ACC/LG	1		
XPX	1	AMC/LG	1		
XR	1	ATC/LG	1		
XRA	1	DLA/LO	1		
XRB	1	PACAF/DOQ	1		
XRJ	1	PACAF/LG	1		
XRL	1	USAFE/LG	1		
XRS	1				
XRX	1	AF ACADEMY/			
XRW	1	DF			
XR-OAS	1				
		AFIT/EN	1		
MSC		AFIT/LG	1		
CC	1				
SXM	1	ASC/AL	1		
		ESC/XR	1		